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IN ADVANCE.

Mackenzie's Steam Jet Exhauster.

As the advantages of an Exhauster are now recognized by all Gas Engineers, we take pleasure in presenting to our readers in this the first number of our new volume, a new and apparently reliable apparatus for this purpose.

It is a Steam Jet Exhauster, and is the patented invention of P. W. MACKENZIE, Engineer of the SMITH & SAYRE Manufacturing Company. It is not claimed that there is anything new in the use of a steam jet to produce a vacuum in the retorts of gas works, as such application has long been familiar to Gas Engineers, and has been described in several works on gas, and its manipulation. It may therefore be asked, and very justly too: If the plan is simple and reliable, why has it not come into general use?

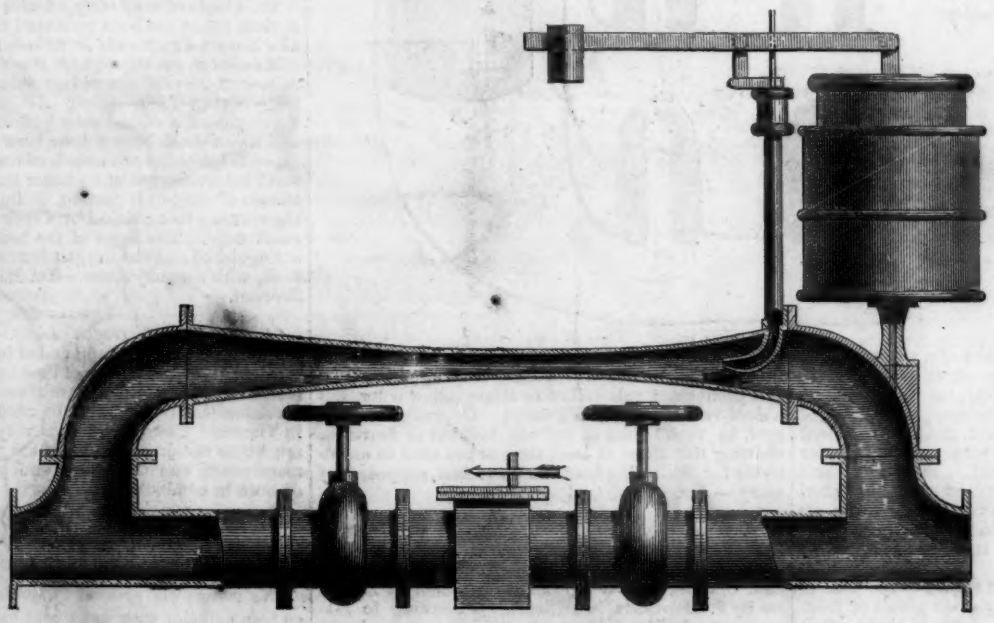
The difficulty has been that in all attempts heretofore made to utilize the agency of steam for this purpose, proper attention has not been paid to the conditions essential to its successful use; as a consequence a greater volume of steam has been required than was necessary to drive machinery that would do more work; and so great as to be injurious in its effects upon the gas.

This result is due entirely to a total lack of attention to the diameter of the steam jet, its velocity, and the form and proportions of the exhausting chamber. All who have attempted it have been satisfied to discharge the jet into a straight pipe, or into a box or chamber, having a larger area than the pipe, thus depriving it of nearly all power, and demanding the use of more than double the steam that is needed to do the work successfully.

Mr. MACKENZIE has spent several years in experimenting, to produce an instrument which would give the desired results, with the least expenditure of steam. This has been accomplished; and that gas can be handled, up to one pound pressure to the square inch, with less steam than by the most perfectly constructed machinery has been proved by actual tests; also, that the volume of steam is not great enough to injure the quality of the gas; but, that being thoroughly incorporated with it, takes up a large portion of the sulphur and ammonia, and assists materially in the washing and purification.

The accompanying illustration shows the form of instrument which gave the best results, and the general arrangements of its parts. It can be applied to any Works as easily as the usual form of Exhauster, and will be readily understood.

The steam passing through the jet pipe with a velocity due to its pressure, creates a current from the Retorts in the same direction. The volume of gas and steam are thoroughly mixed and pass to the washer and condenser, where the steam and such impurities as have combined with it are taken out. The amount of steam is regulated by the make of gas, operating a Governor of ordinary construction, attached directly to the steam valve. A self-acting bye-pass to allow free passage for the gas, in case the Exhauster is not in use, is provided, and valves to admit of ready access to all parts.



MACKENZIE'S STEAM JET EXHAUSTER.

The inventor claims this to be the most durable, efficient and economical Exhauster ever presented to the Gas Companies, and the SMITH & SAYRE Manufacturing Company, who are the manufacturers of the present well known "MACKENZIE Exhauster," are prepared to take orders for any size Steam Jet Exhauster, from 500 to 250,000 cubic feet per hour, and guarantee their operation to be entirely satisfactory. If they do not prove so, they will replace them with their present excellent Rotary Exhauster. Address to 95 Liberty street, New York.

A New Wonder.

Yesterday morning April 9th, Mr. J. B. Knight, agent of the Watertown Steam Engine Company, sunk a drove well in rear of his office, with a view to getting a supply of water; and when at the depth of forty-six feet, a sudden and very powerful draft of gas was observed to flow from the mouth of the pipe. He immediately closed the pipe, thinking to utilize this gas for illuminating purposes, but found the pressure too great; when the idea struck him to direct it into the boiler of one of his engines and experiment with it in making steam. But no sooner had the connection been made than the engine began to run entirely by the pressure of the gas acting upon the piston, at a pressure of 12 pounds to the square inch: and so it continued all day yesterday, giving no sign of exhaustion.

Here is a discovery. A motive power which costs absolutely nothing, sufficient to be made available in running many kinds of light machinery, perfectly controllable and seemingly inexhaustible. What shall we find next under our city?—*N. O. Republican*, April 9th.

Says the *New Orleans Times* of the same date:

A great curiosity is to be seen at J. B. Knight's machinery establishment on Carondelet street, near [illegible] steam engine, Poydras. No less than a stationary [illegible] running without steam. Mr. Knight, having had occasion last week to bore for water at the depth of forty-seven feet, encountered a flow of natural gas, with such a pressure that on attaching it to the engine with a flexible pipe, it drove it with ease. When we witnessed it in operation, the gauge marked a pressure of twelve pounds to the square inch, and the gas from the discharge pipe was burning brilliantly. An engine, apparently furnishing its own power, and a brilliant light to see it by, comes nearer to the realization of a perpetual motion machine than any ever yet reached, —*Exchange.*

"LIQUID GAS."—A sample of the "liquid gas" sold at No. 40 East Broadway was tested by an officer of the Fire Department on the 26th ultimo, and pronounced unsafe for illuminating purposes. It is said the Commissioners will prohibit its further use.

Chemical Repertory,

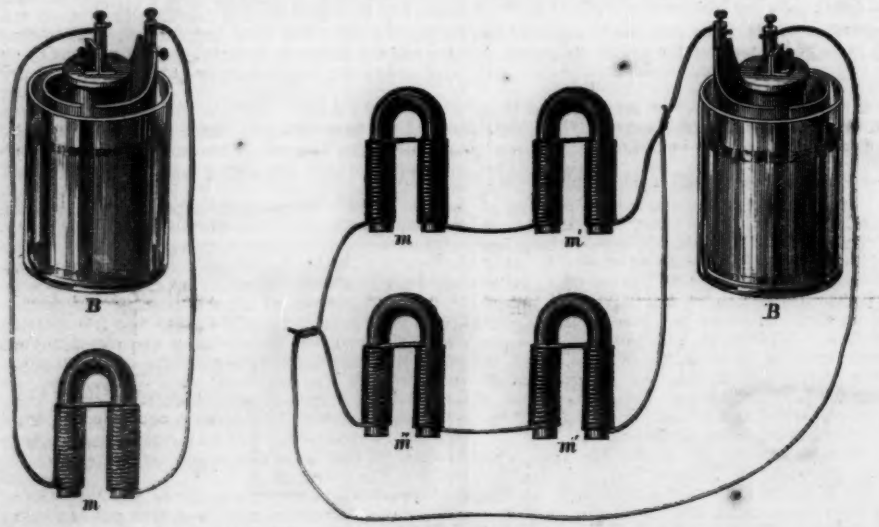
No. 56.—July 3, 1871.

EDITOR—HENRY WURTZ.

ZINC—OXIDATION POWER.

The fallacious excitement aroused some months since by the currency given through one or two scientific journals of high repute and universal circulation, to alleged new discoveries in both the theory and practice of electro-magnetic motors, is probably now on its wane, not however without having done incalculable harm, such as was predicted by those who were competent to grapple with these problems. *Facile est descensus*, and so on. We did something ourselves before to stem the tide of error, but having had our attention called to an exhaustive discussion of the subject, from the able pen of Prof. PHIN, in the columns of our contemporary the *Technologist*, are pleased to give place to the following extracts, hoping that so far as we are concerned, unlike Mrs. Gradgrind, we have now "heard the last of it."

"At a recent fair of the American Institute, there was exhibited an electro-magnetic machine, driven by sixteen cells of Bunsen's battery, arranged in consecutive series or for intensity, as it is called, the wires being very short and stout. Now in this case the inventor ought to have arranged his battery so as to have produced a current of great quantity, but small intensity. As it was, his zinc burned to waste, just as coal



would burn to waste in the furnace of a steam engine, provided the grate surface was enormously large in proportion to the flue or tube surface. Other inventors having found that this was the case, have been led into a mistake of the opposite kind, and have supposed that the greater the length of wire used the greater would be the economy effected. But experiment shows that after we pass the point at which the external resistance—that is, the resistance in the wire—is equal to the resistance in the battery itself, we cease to obtain a proportionate gain, and our arrangement again becomes uneconomical.

"No rule can be laid down in regard to the limit of saturation by magnetism of any given pieces of iron. Different samples of iron vary so much in this respect, that we can determine the fact in any given case only after special trials. But in every case it will be found that there *is* a limit which is soon reached, a point beyond which the iron refuses to receive any more magnetism. Long before [illegible] this point is reached, however, it will be found that every effort to give to our magnet the power of supporting an additional pound, will cost us as much as was required for ten times that amount at the beginning. Thus, suppose we have a small iron core, and that a given current imparts to it the power of supporting 5 lbs.; a current of double the power may, very possibly, make it support 10 lbs., while to make it support 20 lbs. a current of ten times the quantity first employed will be required. But if, on the other hand, we increase the size of the core, we may find that ten times the first quantity of electricity employed will enable the larger magnet to support 50 lbs. instead of 20; and thus the mere increase of the quantity of iron brought into action will increase the actual result obtained. This is the case in the particular form of the experiment adopted by Mr. Highton. It is true that he has made a special arrangement of his magnets, but this would not affect the result, except under certain circumstances coming under the first law that we stated. Aware, apparently, of the fallacy of supposing that power can be obtained beyond a certain point by mere increase in the length of the wire, Mr. Highton divides his current, as shown in fig. 2; the effect of which is simply to double the size and length oft he greater part of the wire, while the aggregateamount of iron contained in the cores is four times that used in fig. 2. No wonder therefore that he gets an increase of power, though to say that he can go on increasing the power *without limit*, is to assert that to which carefully conducted experiments will give a flat denial."

CHEMICAL EXCERPTS.

17. C. HAUGHTON GILL communicated to the London Chemical Society that cane sugar and sal-ammoniac crystallize together, and the curious fact that the compound crystals are *deliquescent*, while neither of the constituents are so at all. He argues hence some sort of chemical combination, through the crystals may contain any proportion of either ingredient.

18. JAMES STODDART writes to the *Chemical News* that he wishes to "draw the attention of manufacturers" to a plan of evaporating sulphuric acid, which he has "successfully tried," which consists in blowing a current of atmospheric air through it at a temperature much below its boiling point (300° F.). A similar method has long been in use in the United States. We are under the impression that it was patented here by CLOUGH, some 15 or 20 years since.

19. R. CARTER MOFFAT on the *Detection of Alum in Bread*.

For this he uses simply a tincture of 120 grains of logwood chips in 8 oz. alcohol, digested 18 hours and filtered. In contact with bread or flour free from alum this produces a pale-yellow or straw-yellow color, but a *dark-red* when alum is present. Operating in Glasgow, he found alum in but one loaf out of fourteen, showing that there at least alum is not used so extensively for whitening bread as has been supposed by many.—*Am. Chemist, April.*

20. *Fusion of Bullets by Impact.*—In our issue of May 2d, page 131, some calculations were referred to of E. HAGENBACH on this subject. We find in the *Am. Chemist* for May a paper in *Poggendorff's Annalen* by J. BODYNSKI, in criticism. According to HAGENBACH a bullet of 40 grammes striking at a velocity of 320 metres per second should develop 4.83 calorific units, which would melt ten bullets of this weight, whereas practically but 27 grammes of the lead is melted. HAGENBACH, it is asserted, omitted all allowance for the absorption of *vis viva* in indenting the target and in producing the recoil of the bullet.

21. *Solvent for Indigo.*—The extensive employment of indigo makes it important to notice some new solvents which V. WARTHA has recently found for it. In the first place, Venetian turpentine, heated to the point of ebullition, dissolves indigo with the same blue color as does sulphuric acid or aniline. After cooling, magnificent copper-red crystals separate. The crystals can easily be freed from the solvent by ether or alcohol. Boiling paraffine is an equally good solvent. A somewhat dilute solution of indigo in paraffine can with difficulty be distinguished from alcoholic solution of fuchsine. After cooling, the separated needles can be cleaned with benzole, etc. Petroleum dissolves indigo to a carmine red solution; so also spermaceti and stearic acid, the first with carmine violet, the last with blue color.—*Journal of the Franklin Institute, June.*

22. *Chemistry of Coal.*—From an article by J. W. DAWSON, in the *Am. Jour. Science* (April, 1871, p. 262) we select the following suggestive communication on this subject from Prof. STERRY HUNT:

"The outer bark of the Cork tree and the cuticle of many if not all other plants consists of a highly carbonaceous matter, to which the name of *suberine* has been given, The spores of Lycopodium also approach to this substance in composition, as will be seen by the following, one of two analyses by Duconi, along with which I give the theoretical composition of pure cellulose or woody fiber, according to Payen and Mitscherlich, and an analysis of the suberine of Cork, from *Quercus suber*, from which the ash and 2·5 per cent. of cellulose have been deducted.

	Cellulose	Cork	Lycopodium.
Carbon	44·44	65·73	64·80
Hydrogen	6·17	8·33	8·73
Nitrogen	——	1·50	6.18
Oxygen	49.39	24·44	20.29
	100·00	100.00	100·00

This difference is not less striking when we reduce the above centesimal analyses to correspond with the formula of cellulose, $C_{24}H_{20}O_{20}$ and represent cork and lycopodium as containing 24 equivalents of carbon. For comparison I give the composition of specimens of peat, brown coal, lignite and bituminous coal.

Cellulose	$C_{24}H_{20}O_{20}$
Cork	$C_{24}H_{18\cdot2}O_{6\cdot7}$
Lycopodium	$C_{24}H_{19\cdot4}NO_{5\cdot6}$
Peat (Vaux)	$C_{24}H_{14\cdot4}O_{10}$
Brown Coal (Schroetter)	$C_{24}H_{14\cdot3}O_{10\cdot6}$
Lignite (Vaux)	$C_{24}H_{11\cdot2}O_{6\cdot4}$
Bituminous Coal (Regnault)	$C_{24}H_{10}O_{3\cdot3}$

It will be seen from this comparison that, in ultimate composition, cork and lycopodium are nearer to lignite than to woody fiber; and may be converted into coal with far less loss of carbon and hydrogen than the latter. They in fact approach closer in composition to resins and fats than to wood, and moreover like those substances repel water, with which they are not easily moistened, and thus are able to resist those atmospheric influences which effect the decay of woody tissue."

23. *Combustion of Oxygen Gas with Smoke.*—This curious result has been produced by JULIUS THOMSEN, as a lecture experiment as follows:

He uses as an atmosphere the vapor either of benzole or of oil of turpentine, produced by boiling in a long necked flask, closed with a stopper, through which passes a central tube ½ of an inch in diameter and also a small lateral tube bent to one side. The vapor is ignited at the mouth of the larger tube, and a small tube recurved at its lower end, through which a stream of oxygen is passing, is immediately inserted, the opening being closed by a cork which slides on the small tube. The flame of the benzole vapor is thus extinguished and the oxygen burns in the vapor in the flask, with a smoky flame.—Dr. BARKER, in *Silliman's Journal.*

24. *Haré's Oxhydrogen Light.*—For photographic purposes it is now recommended to use, instead of Dr. HARE's original cylinders of lime or magnesia, the molecular mixture of the two obtained by burning mineral *dolomite*. It is said to be used by photographers in Vienna. The suggestion is very reasonable, as we must thus obtain a mixture of the rays of calcium and magnesium, and the optical and photographic effects of both in combination.

Kitchen Gas Works.

The genius who proposed to make charcoal by filling an iron cylinder with wood, and using the cylinder as a back log in the old-time open fire-place, has lately been eclipsed by a projector who aims to manufacture illuminating-gas by means of a retort which may be placed "in a kitchen range or any ordinary stove." The retort is made of circular form, of iron, fire-clay, or other suitable material, and so arranged as to be surrounded by the fire. Being filled with wood, resin, oil, or other gas-producing substances, the gas is rapidly given off, and passes by a pipe into another partially filled with water, below the mouth of the outlet pipe dips as in the ordinary hydraulic main. To avoid accidents from any undue pressure in the main from an unusual pressure of the gas, the main is furnished with a safety-valve, the rising of which permits a portion of the gas to escape into a pipe which leads into the chimney with which the pipe or flue of the stove connects. The idea is ingenious, but the kitchen gas works provided thereby will hardly supersede the ordinary methods of illumination in houses and apartments.—*Am. Artisan.*

The Mississippi Valley and Its Resources,

WITH A DESCRIPTION OF THE WORKS OF GEORGE STACEY & CO.—INDIANOPOLIS GAS WORKS, ETC.

[Concluded from page 180.]

IRON WELLS FOR WATER WORKS.

It must not be supposed that the building of gas-holders, and also furnishing all the appliances of cast and wrought iron for gas companies, is the only kind of work in which this company is engaged; they are about constructing two automatic wells for water works, on the Holly system, now so popular throughout the West one for a well at Portsmouth, and the other at Ironton. Last year they constructed one for the city of Covington "in accordance with plans furnished by Mr. B. Holly, sunk for the purpose of procuring a water supply through the substratum of gravel underlying the Ohio River. The tube is eighteen feet in diameter at the bottom, and seventeen feet at top, seventy-one feet in depth, and is constructed of boiler plates ten feet in length, three feet in width, and one half inch in thickness arranged in horizontal sections." In this is a pumping floor substantially constructed of wrought iron, through which runs a 20-inch cast iron pipe, connected with the street main; a spiral stair case of wrought iron, with cast iron stepping plates, goes down to the pumping floor.

The Holly engine at the Covington water works, is one of the finest specimens of mechanical skill we have ever seen; its massive strength and fine action is all that is desirable for the purpose; it appears to be a perfect success.

INDIANAPOLIS GAS WORKS.

These works for a number of years past have been under the control of Henry Stacey, Esq., engineer and superintendent. Since he has had control of them, the works have nearly, if not quite doubled their capacity for manufacturing gas, the whole system of distribution has been changed, miles of large and small mains have been run so that now they are all that can be desired. During the past year he built a new purifying house, which is complete in all its parts. It is square, of brick with stone foundations; it contains four cast iron purifyers, five trays deep, with improved hoisting apparatus, designed by Engineer Stacey, and so arranged that the one apparatus will lift each cover in turn. The purifyers are placed on wrought iron joice, have 16 inch connections, dry centre valve, etc. On one side, separated by a brick partition, on which rests a large water tank is arranged, a circular boulder, washer and four annular condensers, with additional room for extensions, if needed.

In the winter the cold air draws through them from the basement and condenses the gas in an admirable manner, as can be seen by the thermometers attached, on the front of each condenser; in the summer a bottom is fitted to the internal column (they are made of wrought iron), an inch tube is placed in the center, and the whole internal part filled with water, while the overflow runs down the central tube, thus having the same amount of surface exposed, they operate in the same manner as a multitubular condenser, at much less cost. No expense has been spared in making this purifying house one of the best in the West, for the purpose intended to be served.

These purifyers and all the other cast and wrought iron work was furnished by George Stacey & Co., and while speaking of this matter we would state, that this firm made last year for the Cincinnati Gas-Light and Coke Company four cast-iron purifyers, 25 feet square, seven trays deep, with 20 inch connections, dry centre valve, hoisting apparatus, etc.

While in Indianapolis, in company with President S. A. Fletcher and Engineer Stacey, we witnessed the lowering of the lower half (which is always built above ground) of the new telescopic holder, just finished by the elder Stacey. It is 70 feet in diameter, the sections being each 14 feet deep. There are eight Ionic cast iron columns with wrought iron lattice girders; these columns were also cast by Stacey & Co., and make a very handsome appearance. The holder is a fine specimen of workmanship, and is intended to replace a single lift holder which was not of sufficient capacity for the present wants of the city. Their other holder we think is 130 feet in diameter.

We were invited by President Fletcher to accompany him to the office of the company, where he kindly exhibited and explained the operation of one of

KIRKHAM AND SUGG'S PHOTOMETERS,

obtained through the American Meter Company, for the purpose of determining the candle power of gas by the height of the flame under certain pressure.

This instrument of which there are said to be very few in this country, was a splendid specimen of mechanical ingenuity, and one of the simplest and best methods we have yet seen for determining the photometric value of gas, which may be ascertained by any intelligent person in broad daylight, without the complex machinery, calculations, and uncertainty of the old Bunsen and other photometers. It consists of a pressure gauge with a float, operating over a brass cylinder delicately adjusted, with a long brass indicator attached, the cylinder revolving as the float causes it to move. On the front was a semicircular scale divided into one hundredth of an inch; this was enclosed in a case with glass in front. On the outside of the case, to the left, was a vertical brass cylinder, three inches diameter, and about eight inches in length, so arranged as precisely to adjust the water line, so that the pointer of the pressure gauge should indicate the (O) zero mark on the scale; on the right hand side were two automatic governors for regulating the flow of gas The case was prismoidal in shape about two feet high, of wood; on the top was arranged a slightly tapered perforated tube, about one foot high and four inches in diameter at the bottom, for the purpose of maintaining perfect combustion. A part of the front of the case was a colored glass, precisely seven inches wide, the bottom of which was exactly on a level with the top of the lava tip burner on the inside. On a card conveniently placed to the right, was a prepared sheet with perpendicular and horizontal lines, across which diagonally a red marked line ran, intersecting these lines. Along the bottom of the sheet were figures indicating the amount of pressure; on the side was marked the different degrees of candle power. Having ascertained the amount of pressure requisite to procure the necessary height of flame you looked for the proper figure on the bottom; you then follow up the perpendicular line indicated, to where it crossed the red diagonal bar, when by following the horizontal line intersected at that point, towards the left, the proper candle power was noted, which at the time of the experiment, showed a pressure of .51 of an inch and 19 candle power.

The *modus operandi* of the instrument appeared to be as follows: The pointer of the gauge was placed at the zero (O) mark. the pressure was then put on, the gas lighted, and left to burn some little time, so as to obtain a fair test; the governor at the right was then weighted accurately, with small pieces of lead, until the top of the flame appeared—when standing in front, three feet from the instrument and looking horizontally over the colored seven-inch glass—level with the top of it; when the flame maintained its position at that point for some time, you noted on the scale the number of hundredths of an inch pressure the gauge indicated, and then by reference to the card, determined the candle power. We do not pretend this to be an accurate description of this admirable instrument, as we took no notes nor measurements, but merely give our impressions from memory, during a brief examination of its working. We here wish to express our great gratification in seeing this complete instrument for ascertaining the photometric value of gas, so easily operated and so easily understood. President Fletcher has our warmest thanks.

At the office we saw our old friend, Mr. Peck, who is building gas works at Elkhart, Ind., and last fall finished the Mattoon (Ill.) works, both built by this company from the plans of, and superintended by Engineer H. Stacey. We also met here Geo. Stacey, Jr., until recently superintendent of the Vicksburg works, Miss.

Dangerous Burning Fluids.

It would appear to be the duty of every scientific journal to utter a note of warning against the dangerous burning oils with which our country may be said to be literally flooded. The number of accidents arising from the use of adulterated oils is so great that many life insurance companies are disposed to charge higher rates where petroleum is employed in the family of the assured. The community is always deeply shocked at a murder or railroad accident, and a thorough examination is at once held by the coroner; but the burning to death of whole families, the immense destruction of property from fires occasioned by adulterated and dangerous oils, make no more than a passing impression. There appears to be no doubt that the number of deaths from this cause is far greater than from railroad accidents; and the sooner the most stringent measures are adopted to guard the community against the repetition of such calamities, the better for all concerned.

We desire to call attention to the mountebanks who travel around the country to exhibit their non-explosive oils They show that it is impossible to explode their particular brand, and they give as a reason that it has been treated with certain chemicals in a way to remove all danger. The oil, they say has been "carburetted" or "carbonized," "ozonized," "oxygenized," and is no longer liable to explosion. They put some of the fluid in a can and set fire to it, and sit down on the can. They perform as many tricks as the most experienced master of legerdemain, and perfectly silence unscientific listeners. These men are one and all, impostors, and if you live in the country, call in the hired man and turn them out of doors, if you reside in the city, call in the police and enter a complaint against them then and there, and have free lodgings provided for them in the station house.

Nobody pretends that naphtha, alcohol, ether and the like are explosive. They can be lighted and burned quietly and in the most inoffensive manner. It is only when mixed with the oxygen of the air that an explosive compound is produced, and this part of the experiment is naturally omitted by the exhibitor. It requires considerable skill to prepare just the right mixture of light oils and air to insure success, and it is under cover of this difficulty that the dealers in adulterated oils escape detection. Unfortunately, just the proper mixture is sometimes formed in lamps as the oil is exhausted, and the fatal explosion takes place. The number of accidents from the bursting of lamps is very small, and it is not the question of explosion that should attract the most attention. By far the greater number of deaths and losses by fire have arisen from the ignition of the lamps or cans, either from the breaking of a lamp or some careless handling of the petroleum—the ignited fluid spreading over the clothing of the person or on the floor is what does the damage. It ought to be understood that there is no chemical that will make an oil safe; the patents and claims on this subject are sheer impositions. The only way to make an oil safe is by distillation, that is, removing from it all oil or naphtha that will take fire below 110 deg. F.

Any oil that can be lighted on its surface by a match and will continue to burn without a wick, is unsafe. Sperm oil, rape seed oil, and the refined petroleum can be poured upon the floor and a match applied, but they will not burn; it is necessary to heat to a high point before any vapor will come off that will take fire from a taper and continue to burn. Any oil that, when poured into a saucer, will take fire from a match and continue to burn as alcohol does, is unsafe, and ought to be discarded at once. Such an oil contains volatile compounds which can give rise to explosive vapors, and if the lamp breaks, may occasion the most dangerous burns. We must therefore warn all persons from using such oils about the premises.

There is another danger to which we wish to call attention and that is the use of cheap fluids in the so-called vapor stoves. Next to the use of gun-powder for heating purposes, we know of few things so dangerous as these inventions. Their very utility is founded on the conversion of the oils into a vapor so that it can be readily ignited, and afterwards the heat of combustion keeps up the supply of gas. The persons who use these contrivances first manufacture a vapor that, when mixed with air, is fearfully explosive, and then in defiance of fate, they put a light to it, and ought to be thankful that the whole apparatus is not blown to atoms. The inventors of these infernal machines are fully aware of the danger, and hence the long list of precautions that accompanies each package; all of the directions are intended to guard against the formation of the explosive mixture of air and vapor mentioned at the outset of our article. The skill required to manipulate such contrivances is of the highest character.

We have used them in laboratories to produce a powerful gas jet for many years, but never allowed any but experienced assistants to attend them. In inexperienced hands or where the greatest care is not constantly exercised, they should never be used. We repeat, trust none of the so-called non-explosive oils or patent contrivances to burn them.—*Journal of Applied Chemistry.*

The Electric Light.

The light produced from a powerful current of electricity, under favorable circumstances, is the most brilliant ever yet discovered by man. By actual experiment it has been shown to possess an intensity equal to one third of that of sunlight. The light emanating from an incandescent piece of lime under the action of the oxy-hydrogen jet, well known as the Drummond light, cannot compare with it in brilliancy, nor compete with it in point of economy. Though the first cost in the preparation of an electric light may exceed that of the Drummond light, the subsequent outlay is much less.

The light is produced by passing an electrical current between two pieces of charcoal a small distance apart, one connected with the positive pole and other with the negative pole of a galvanic battery. In order to keep these burning charcoal points always at such a distance from each other as to produce the most brilliant light, ingenious machines called "regulators" are used. The principle in the construction of these

machines is, that the nearer the charcoal points are to each other, so much greater is the flow of electricity. Now, increase in the flow of electricity in the conducting wire will produce corresponding increase of magnetism in an iron bar which it encompasses; therefore, one of the charcoal points is inserted in an iron cylinder, which plays freely up and down in the center of an electro-magnetic coil. As this coil exerts an attractive influence upon the iron, a weight passing over a pulley is attached to it, which, acting as a counterpoise, keeps it in equilibrium. The other point remains fixed. The result of this arrangement is that an increase of distance between the charcoal points gives a decrease in the flow, and consequently a decrease in the attractive power of the coil. The weight, for this reason, overbalances the attraction of the coil, and the charcoal point is drawn up until the increasing flow of electricity, caused by the decreasing distance between the charcoal points, shall have sufficiently augmented the attractive power of the coil so as to restore the equilibrium.

The regulators employed in general use are much more complicated, but their principle is the same.

A machine has been invented in France by means of which this light may be derived from electro-magnetism. It consists of eight rows of powerful horse-shoe magnets arranged around a hollow cylinder and having their poles towards the axis of the cylinder. The magnets are 7 in each row, 56 in all, and are attached to a stationary frame. The hollow cylinder has affixed a set of double coils or bobbins, 112 in all, so placed that, on revolving the cylinder, the ends of the bars, which are the cores of the bobbins, are in rapid succession brought in close proximity to the poles of the magnets, alternately approaching to and receding from them, with great rapidity. This causes a succession of almost instantaneous electrical impulses to be given to the wires coiled around the bars. Connecting this machine with the charcoal points and revolving it at such a speed as to make the flow almost continuous, for the light only shines while the current is passing, a steady light will be produced.

It has been found, by experiment, that if a speed sufficient to give 200 electrical impulses per second be given to the machine, the eye no longer takes cognizance of the intervals, and an uninterrupted light is the result.

A curious example of the correlation of forces is shown in the working of this machine. The cylinder, which is hung in its bearings so delicately that it would seem possible for a child to revolve it with ease, really requires a two horse power engine, owing to certain effects produced by the action of the magnets in connection with the coils. This force expended is represented in the light produced; the machine converting force into electricity, and electricity into light; as in the case of the galvanic battery, the force resulting from the decomposition of zinc is the producer of the light.

The uses to which this light may be advantageously applied are numerous. Its peculiar penetrating power renders it unrivalled for light houses and signal lights for vessels. Let the darkness be so great that it can "be felt," its light pierces it like a great silvery needle, and falls like a ray of hope upon the seething ocean, which, but for its warning, might have been the watching sailor's grave.

It has been used with success for illuminating mines. During the siege of Paris, the Prussians were much annoyed by one of these lights, which the Parisians had constructed and placed upon Fort Mont Valerien, and which effectively prevented any hostile movement being made by the Prussians under cover of the night.

For stage effect, illuminating halls, streets, or other public places, and for microscopic or magic lantern exhibitions, it may be used.

The application of the electric system for illuminating Bergen Tunnel, through which the Erie Railroad and Delaware and Lackawanna Railroad traverse, we believe could easily be accomplished. Its adoption would relieve the thousands of passengers, who are carried through this tunnel daily, of the apprehension of accident which is irresistible to most persons as they enter the dark and cheerless cavern.

In fact, its uses are so numerous, and its effects so brilliant, that it is a wonder it has not been more universally adopted.—*Scientific American.*

Dr. Letheby has reported upon Dr. Eveleigh's method of producing gas at a low temperature in iron retorts. The peculiarity of the manufacture consists in the distillation of the coal at a low temperature, and the subsequent conversion of the volatile constituents of the tar into permanent gas. This gas is much less offensive than ordinary gas, and it is so rich in hydrocarbons that it cannot be burnt, from a standard argand burner, with 15 holes and a 7-in. chimney, at a larger rate than four cubic feet per hour, giving at this rate the light of 15·7 standard sperm candles.

The Stevens Institute at Hoboken.

[Concluded from page 181.]

In accordance with this general plan a massive building, with a frontage of one hundred and eighty feet upon the public park of Hoboken and a floor space of about one acre, has already been erected. Its architecture, though simple, is imposing from its appearance of great strength and durability, the walls being of very thick trap masonry, lightened about the doors and cornices, with trimmings of red and yellow sandstone. The interior has been very successfully adapted to the various objects for which it is designed. Upon the right and left sides of the hall, in which the visitor finds himself when he enters by the principal door, are the elegantly furnished reception room and the office of the president. At the farther end of this hall is a doorway leading into an auditorium capable of seating comfortably an audience of over six hundred hearers. It is designed not only for the commencements and public occasions of the institution, but as a place for the delivery of popular lectures upon science and the mechanic arts to the citizens, and for this object it is permanently provided with all the modern machinery of illustration in the shape of battery currents, oxygen gas, screens, etc. The remainder of the first floor is occupied by two great rooms. One is used as a library and model room. It is amply stored with literature in various languages of the sciences taught in the institution, and with models of the most important machines and mechanical contrivances. The other room is devoted to practical work and researches in physics. Students will here familiarize themselves with the working and construction of engines, with the mode of computing the value of trains of wheel work and of combinations of mechanical powers, of determining the foci of lenses, and with the manage ment of optical and all other instruments of physics. On the second floor are lecture and recitation rooms devoted to mathematics, natural philosophy, and engineering. The same system will be followed in all these departments of making them thorough and complete by limiting the subjects taught to those most essential to the student's practical knowledge of his future pro fession. As for example, his acquaintance with mathematics will be tested every step of the way by problems of mechanics and engineering worked out in connection with the machines themselves, and thus instead of acquiring with immense difficulty a science to be immediately forgotten for lack of the practical knowledge requisite to apply it, he is possessed of a tool in the shape of mathematics which he can apply every hour. In the third story are rooms to be devoted to topographical and mechanical drawing, photometry, photography, languages, etc., and to the manufacture of the instruments demanded for use and instruction in the institution. The latter will be in charge of experienced makers of philosophical apparatus.

For motive power to operate the lathes required in these and other parts of the buildings we must descend to the basement, where we shall find a steam engine. Near the latter are furnaces devoted to the various operations of metallurgy, and in another part of the basement are gas-holders for keeping the illuminating gas under greater pressure than that at which it flows from the mains, and for containing oxygen. A separate room contains the batteries used to operate the telegraph and electric lights employed in the building. All the gongs in the different parts of the building are rung at the same time by the telegraph, which is connected with the clock in the president's office, and by a similar contrivance signals are transmitted to officers in the various rooms.

The chemical department, for obvious reasons is accomodated with a separate wing. The first floor is devoted to a laboratory, arranged with every facility for the analysis of ores, rocks, and minerals, separate deks and suites of chemicals being assigned to each student. The second floor is occupied by a chemical lecture-room and a museum of chemical analysis; the third by a cabinet of minerals and metallurgical specimens, by the private laboratory of the director of this department, and rooms intended for special students engaged in chemical researches. Besides the foregoing there will be apartments devoted to photography, spectroscoy, gas analysis, and other applications of chemical science.

It will be seen from the above that this institution is capable of meeting in the fullest manner the great wants of our country at the present time. It proposes to develop to the farthest point practicable the native genius of every student, and to supply to our great mechanical and manufacturing establishments labor which, in the highest sense of the word, may be termed skilful.

The Water Supply of London---Sea Baths in Cities.

The water consumption of the city of London, with its four millions of inhabitants, is provided by several joint-stock companies, of which the New River Company is the largest and most important. The New River is a canal, made by Sir Hugh Myddleton, an eminent engineer of the seventeenth century, chiefly from philanthropic motives. The payment to the company is made by each householder, and is proportioned to the number and size of the cisterns in the house. Although the price is not high, probably not higher than an assessment for water supply would be, the density of the population gives the water company an enormous revenue, so large, indeed, that the amount of the dividends, upon the stock, is kept a close secret, both by the company and the stockholders. Stock, of which the original par value was £100, has been renominated and sold, in many instances for £20,000 and over; but of course such property is not often parted with, and the real value of such a stock cannot readily be ascertained.

London lies in a basin of about fifty miles in diameter, and the whole of the watershed of this district ought to be made available for the supply of water; but the greensand, which is the recipient stratum, lies at a great depth, and boring for water, to any great extent, has never been attempted. If wells were sunk on an a sufficiently large scale, no doubt water could be found amply to provide all London with this indispensable element, at a merely nominal rate.

The water used for bathing and for watering the streets is an important part of the consideration, and a proposition has been often made to convey sea water from Brighton (52 miles from London, and the nearest point of the coast); and this idea is now again receiving public attention. A water main, with pumping engines, could be provided for £500,000, the main taking the "sixfoot" of the London and Brighton Railway, which line is nearly straight for the whole distance. To provide sea water baths for such a population is an undertaking of the highest importance to the health and comfort of the people.

As New York will some day rival London in its extent and population, it would be well for our city authorities to consider the desirability, and the means at their disposal, of establishing sea water baths in all parts of the island of Manhattan. The popularity of those already established shows the feeling of the inhabitants of the city, and any one taking up the subject and carrying it vigorously to completion, may depend on the public support. It could be done now, easily and cheaply; fifty years hence it will be a formidable and expensive undertaking. The sea is around the city, and the health-giving element can easily be pumped into swimming and other baths; but, when yroperty has enormously increased in value, and population in numbers, the work may be as difficult to achieve as it is in London.—*Scientific American.*

Coal on the Isthmus of Panama.

An unexpected and most important discovery of coal beds on the Isthmus of Panama, made three or four years ago, has recently been brought practically to public attention by a trial of the coal at Aspinwall. The result leaves no doubt whatever that the mineral is of excellent quality, superior to the Cumberland coal, and quite equal to the best Newcastle.

The coal beds lie on the River Indio, about thirty-five miles from Aspinwall, and are the property of the Rev. Richard Temple, an English clergyman, who, visiting the Isthmus for the benefit of his health, was led by a love of geological investigation to examine the formations of the country, and was splendidly rewarded in being able to secure one of the most valuable coal deposits in the world. Singularly enough the fact of the existence of coal on the Isthmus is directly at variance with the theories of the great Humboldt and other great geographers, who were of opinion that coal would never be found of good quality and in large quantity in volcanic countries.

As these coal beds may be said to be inexhaustible, the importance of the discovery to commerce can hardly be overestimated. Three or four years ago an animated discussion was created in England, by the report of Colonel Sevons, on the rapidly decreasing supply of coal in the English mines, and the opinion expressed by him that in eighty years at farthest it would be entirely exhausted. But here we have an almost limitless coal region discovered and owned by an Englishman, adequate to the wants, for an indefin-

ite period, of all the countries now tributary to England for this indispensable product.

The large number of steamers that ply regularly to Panama and Aspinwall are now under the necessity of taking in coal at those ports, every pound of which has been carried thither from England or the United States, but Panama and Aspinwall will henceforth be a coaling station at the mere cost of mining the coal, which is within a few hours' transit of their wharfs. This advantage will be immense when the interoceanic ship canal across the Isthmus, now believed to be entirely practicable, shall have been completed, for the voyage to India, by way of the Suez canal, is rendered the more expensive by the cost of transporting coal to Aden, the only convenient coaling station on the way, from far distant England around the Cape of Good Hope. Indeed, we may regard the discovery of the coal on the Isthmus as another guaranty of the speedy construction of the Inter-Oceanic Canal at Darien, and as securing for that great future highway of commerce the larger part of the trade of the world.

Dangerous Well Water.

It frequently happens that wells, which at one time were supplied with pure and fresh water, in the progress of building and change of population, become contaminated with organic matter, having its source in cesspools, outhouses, and the like. A convenient way of testing whether the well is subject to external influences, is to employ a salt of lithium. For example, pour into the cesspool a small quantity of a soluble salt of lithia, and after a few hours, test the well water to see if any of the lithia has percolated through the soil. The least trace of lithia can be shown through the spectroscope, and a subterranean connection, with the well, at once determined.

There is nothing more dangerous than organic matter in drinking water. To such impurities have been traced many cases of typhoid fever, cholera, and other epidemics; and too much caution cannot therefore be observed in the location of wells. On the upper part of the island of New York are numerous wells, and, from the nature of things, must be simple reservoirs for the open drains of these wards. They are fever receptacles, and must be the occasion of much of the sickness that is known to prevail there. On the corner of Eighty-second street and Eleventh avenue is a well that has been used for forty years by the pupils of a large public school. It was formerly in the country, but now is surrounded by houses, privies, and open sewers, and must be a perfect mine of disease. If the chemists of the Board of Health were to try the lithia experiment, and thus trace a connection with the open privy of the school, they would be able to see if it were safe to permit the children to use such water; and they could also pronounce the privy a nuisance to the vicinity. In London, all such wells have been suppressed by the government; but not until the lives of many persons were sacrificed to the apathy and ignorance of the authorities.

The insidious character of water cannot always be determined by a direct chemical analysis, and the taste of soft water becomes more palatable than that of hard, so that it is better, if possible, to prove a connection with drains or pools, in order to frighten persons from using water from unwholesome wells. As lithia is not a poison, its use for this test can be safely tried.—*Scientific American.*

History of Gas-lighting.—Street lighting seems to have originated in London, where, in 1414, the citizens were ordered to hang lamps before their doors. In 1558 Paris was illuminated by large vases placed at the corners of the streets and kept filled with pitch. The use of coal-gas for light was first practically applied by a Scotchman, Mr. Murdoch, who lighted his house and offices, in Redruth, Cornwall, with gas in 1792. "The Gas-light and Coke Company," after much struggling for its charter, commenced business in London in 1813. Napoleon thought the idea a "great folly," and Walter Scott predicted that London would be in flames from one end to the other if it should be put into practice. In this country, the Baltimore Gas Company, in 1816, attempted the manufacture of gas from tar, but it was not successful till 1821. Boston followed in 1822, both the Boston and Baltimore companies being still in existence. New York, beginning in 1823, was not successful in introducing it till 1827, but since that time lighting by gas has won its way even into the far distant lands of South America, Asia, Australia and Tasmania.

A New Gas Burner.

The *English Mechanic* thus describes a new burner for causing gas to emit intense light and heat:

"The construction of this boiler is as follows: The coal-gas issues through a straight iron tube about six inches long and of the thickness of a good sized quill. It is not brought to a point. Around this tube is wound a helix of copper tubing of about half the diameter of the iron tube. It makes seven or eight revolutions, and has attached to one of its ends a piece of india-rubber tube with a mouth-piece, while the other end is brought straight out, lying along the iron for half an inch or so, terminating just on a level with the latter, and, at the extreme end, encroaching slightly into it through a little notch cut on one edge of the orifice. A short distance below this arrangement is placed a Bunsen's burner, which, when lighted, plays about and around the helix, heating it to a considerable degree. The coal-gas is now turned on through the iron tube and lighted. A blast is next blown by the mouth through the helix, and the new flame is complete. The Bunsen burner heats both helix and iron tube; hence both the coal-gas and the common air are heated in passing through. With it there has been a hole melted through a plate of gold an eighth of an inch thick in a few seconds—a most effective proof of its heat. A piece of platinum wire one-fiftieth of an inch thick has been fused at one end into a bead in a very short time. The heat of melted platinum wire is quite intense enough for producing an effective lime light.

"With results so striking as these produced with an extemporized jet, made by one who mignt be called an amateur mechanician, what may we not expect when the practical application of the idea is elaborated and perfected, and instruments produced with an efficiency of construction which a large demand would enable makers to do? The helix form inclosing the straight tube was the first idea which occurred to the inventor, but it can easily be seen that it is not the most efficient form for heating the gases, the coal-gas not receiving near so much as the other. A construction might be adopted in imitation of the more circular boiler of a locomotive for heating both coal-gas and air, the boiler being supplied from some reservoir on a bellows principle with the desired pressure, the application of livng power being quite out of the question, except for occasional experiment. There is probably no practical reason why this new heat and light burner should not become of vast public importance for illumination on a large scale."

Waste from Gas Works.

Constant progress has been made in the utilization of the waste substances produced in the manufacture of illuminating gas. At one time the companies paid persons for carting away the lime which had been used for purifying the gas. The lime absorbs bisulphide of carbon, sulphuretted hydrogen and sulphur, coming from the distillation of the coal, and when exposed for a long time to the atmosphere it absorbs oxygen and becomes the sulphate of lime or plaster—the value of which is now so well known. By using oxide of iron, and saving the sulphur and ammonia the cost of purifying gas is much reduced. The material from the purifiers is heated to about 1,000 degrees Fah., in a close iron retort, and a portion of the sulphur combines chemically with the iron, while the balance is distilled over. As soon as the sulphur ceases to come over, the contents of the retort are drawn and moistened and exposed to the atmosphere. The oxidation is rapid, and the mass glows until frequently wet and stirred. In a few weeks a sulphate of iron is produced, containing thirty to forty per cent. of sulphuric acid. The salt is decomposed by passing the vapor of ammonia from the waste waters of the hydraulic mains through it. In this way, sulphate of ammonia and an oxide of iron are obtained. —*Exchange.*

The *Memphis Appeal* says that application has been made by the authorities or others of Jackson, Mississippi, to the owners of the new gas patent (Rand's) in this city, for the right to use the mode so strongly approved here, and to be adopted everywhere. A better light and cheaper than that from coal gas will hardly fail to be adopted everywhere, and this costs so little that towns like Grenada will soon be illuminated by gas.

Hydrostatic-Galvanic Gas Lighter.

A number of patents have been taken out for the instantaneous ignition of gas by electricity, but they all require the laying down of long connecting wires, and more or less complicated apparatus. Professor Klinkerfues, of the University of Gottingen, has invented for his use, in the Astronomical Observatory, of which he is Director, a simple apparatus, which may be capable of more extended application than the learned professor contemplated when he had it constructed. It was in this same observatory that the famous Gauss had an electro-magnetic telegraph in operation ten years before one was set up in the United States, but in those days there was little enterprise among the scientific journals, and so the world lost the benefit of the inventio .

We therefore hasten to relate what Professor Klinkerfues has done to avoid repetition of the former error; but we are unable to give the drawings, as they have not yet reached us. The hydrostatic-galvanic gas lighter consists of a simple apparatus, attached to each street lamp or gas jet, and communicating with the supply pipe in such a way that by increasing and diminishing the pressure, it is immediately brought into or thrown out of action. Keeping the apparatus in order would be the work of the lamp cleaner, and would not require any particular skill. It is well known that a jet of steam, through wire gauze or pointed teeth, will evolve electricity, and it is probable that the same principle is applied to a jet of gas. The experiments tried in Gottingen are said to have been entirely successful.—*Scientific American.*

Compressed Air as a Motive Power.

The confidence felt in scientific circles as to the effective value of compressed air as a motive power appears to be undiminished, and the anticipation is cherished that, in certain branches of manufacture, a complete revolution will follow upon the general introduction of this simple and economical substitute for steam or water power. Whether engines of very high pressure can be successfully worked by this new agency is still a debatable question; but some recent experiments made by Mr. Spear, a well known mechanician in Maine, have developed some fresh and important facts in this connection, which have excited much interest. Mr. S. has succeeded in inventing a governor, which as easily controls the pressure as the governor of a steam engine. He claims that air can be compressed in the reservoir to an extent double the power of the engine that compresses, thereby saving a very large per cent. in fuel; that the pipes can be extended to an almost indefinite extent; and the obstacle of friction, which has hitherto proved almost impossible to deal with, is by a simple invention, entirely overcome. The necessity of long lines of shafting in large establishments is thus obviated, and each workman becoming, as it were, his own engineer, the work of keeping a large engine constantly running, when perhaps only a small part of the factory's machinery is in motion, is done away with.

Dry Gas Meter.—We notice among the new American patents, published in the *American Artisan*, that A. W. Almqvist and F. W. Ofeldt, of New York City, have patented a dry gas meter. This apparatus comprises the combination of two chambers, each formed of two spheric or nearly spheric segments, with each other and with a valve of peculiar construction. Also the arrangement of these two chambers at such an angle to each other that the two sides of the casing tangenting the outer curves of the said chambers, between their centers and rear edges, may meet at right angles in a defined point or place, so as to obtain sufficient space for the play of a crank of such length as to secure an easy movement of the valve, while maintaining the meter within small and convenient compass, and giving it the desired prismatic form adapted to fit in the angle of a room.

Extinguishing Fires with Gas.

A company in New York proposes to introduce the use of carbonic acid gas as a means to be employed instead of water in extinguishing fires. It is claimed that carbonic acid gas can be delivered through the steamers at present used by the Fire Department as easily as water and with far greater effect. To prove this to be the case, the company propose to make a public trial of their invention on a large scale. At the last session of the legislature a law was passed authorizing the company to lay pipes three feet beneath the level of the streets for the purpose of conveying their gas. It is their purpose shortly to avail themselves of this permission, by carrying pipes from one of the reservoirs of the Manhattan Gas Company, to a vacant lot distant two miles and a half in the upper part of the city, upon which an ordinary three story building is to be erected and filled with material of the most combustible character. The building is then to be fired and engines summoned in the usual manner. On their arrival the hose will be attached to the gas pipes of the company and the firemen will proceed to extinguish the fire with carbonic acid gas. This experiment will, it is estimated, cost $30,000, but so great is the confidence of the managers in the success of the scheme, that they feel justified in the expenditure of this large sum on a public test.

Gas and Gasoline Machines.

A Committee of the New York Board of Fire Underwriters in an able report on the use of gas and gasoline machines, says:

DANGER IN HANDLING.

It is admitted that so long as the material remains in the machine, and until it is converted into an illuminating vapor no risk attends it—but there *is* danger —*great danger* connected with filling the machine, and in drawing off any of the fluid of a non-evaporable character, or for repairs; also from liability to accident from leaking, or from careless management, or from defective construction of the machine. It is, therefore, deemed important that in all cases the materials and the machine should be excluded from the insured building.

How remote the gas-house or vault containing the reservoir and machine should be from the premises, will depend upon circumstances. When the gas-house is used for no other purpose than that of holding these articles, a distance of fifty feet is abundant, and under some circumstances a nearer proximity to the building insured would not be attended with any increase of hazard, provided the receivers, holders, or carburetors are made perfectly tight, so as to prevent any leakage or the escape of vapor. The Committee are of opinion that all manufactories, and all large structures, such as hotels and public buildings, the distance of at least fifty feet should be rigidly insisted upon.

Professor Abel, of the English war department, Woolwich, has been for some time engaged on experiments with a new explosive compound, "picric powder," a much more explosive agent than gunpowder, though less so than nitro-glycerine or gun-cotton. The committee on explosive agents have pronounced the new powder to be worthy of extended experiments, especially as a material for charging shells. Dynamite and lithofracteur, both of them modified conditions of nitro-glycerine, are also attracting much attention; large experiments have been made in some extensive quarries near Shrewsbury, with apparent success. It will be remembered that lithofracteur was employed by the Prussians in blowing off the muzzles of French guns captured in Fort Issy.

TO INVENTORS AND PATENTEES.

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Pertaining to the Specialties of this Journal, for the two weeks ending June 24th, 1871.

115,557.—Gas Meter.—A. W. Almqvist, F. W. Ofeldt, New York.
115,588.—Gas Retort.—C. F. Dieterich and A. Schussler, New York.
115,591.—Gas Machine.—T. B. Fogarty, Brooklyn, N. Y. Six other patents.
115,632.—Center Seal.—P. Munzinger, Phila. Pa.
115,658.—Water Gage.—C. Tivnan, Holyoke, Mass.
115,666.—Gas Heater.—H. F. W. Wesche, New York city.
115,670.—Pumping Engine.—N. W. Wheeler, Morristown, N. J.
115,681.—Water Wheel.—W. Bayley and A. B. Crowell, Wilmington, Del.
115,684.—Gas.—H. Bloomfield, San Francisco, Cal.
115,718.—Water Wheel.—J. F. M. Doan, Niles, Mich.
115,774.—Water Wheel.—L. D. B. Shaw, Boston, Mass.
115,788.—Exhausting Gas.—S. Trumbore, Easton, Pa.
115,796.—Carbureting Gas.—S. Whitney, Flushing, N. Y.
115,873.—Carbureting Gas.—C. B. Loveless, Syracuse, N. Y.
115,901.—Water Heater.—D. Smith, J. Lynch, Boston, Mass.
115,937.—Water Meter.—J. W. Cremin, New York city.
115,988.—Carbureter.—Byron Sloper, St. Louis, Mo.

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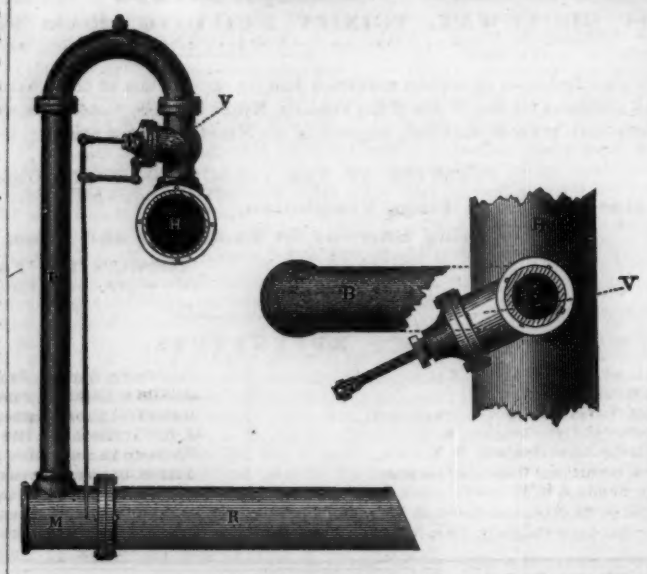

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M Mouth-piece.

P Stand-pipe.

B Bridge-pipe.

H Hydraulic main.

V Valve-substitute for Dip-pipe.

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THE GAS MANAGER'S HAND BOOK; consisting of Tables, Rules, and Useful Information for Gas Engineers, Managers, and others engaged in the Manufacture and Distribution of Coal Gas. By Thomas Newbigging; 8vo. cloth. $3.75.

BOWER—Gas Engineer's Book of Reference, illustrated, 4to. Price, 75c.

CLEGG—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. Price, $10.50.

COLBURN—The Gas Works of London, 12mo, boards. Price, 60 cents.

CROLL—Report of the Proceedings on the Arbitration with the Great Central Gas Consumer's Company, 8vo., cloth. Price, $2.50.

HUGHES—Gas Works and Manufacturing Coal Gas, 12mo. Price, $1.50.

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D'HURCOURT—De l'Eclairage du Gas. Par E. R. Hurcourt, 3d edition. Paris, 1868; 8vo. and plates, $7.50.

RICHARD—Gas Consumer's Guide, 12mo. Price, 50 cents.

SWEET—Special Report on Coal, showing its Distribution, Classification, and Cost, delivered over different routes to various points in the State of New York, and the principal cities on the Atlantic Coast. By S. H. Sweet, with Geological Maps. 1 vol. 8vo. cloth, $3.

SUGG—Gas Manipulation, with a description of the various Instruments and Apparatus employed in the Analysis of Coal and Coal Gas, 8vo., cloth. Price, $7.50.

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AMERICAN GAS SCREENS.

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The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas works, this fact of having *open Trays* would become more apparent to managers of gas works. The difference in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

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Respectfully yours,
JAMES H. ARMINGTON, Sup't.

There are over sixty Gas Companies using our Screens, which are made of oak and rattan; are light, strong, and durable, and the most economical, for reasons set forth in the above letter.

We have just had completed improved machinery, which will enable us to ensure a thorough made Screen, of even greater strength than heretofore.

Orders solicited for immediate delivery, or in the Fall.

Am. Gas Screen Manufacturing Co.,
Haverhill, Mass. 244-3m

SITUATION WANTED.

A GAS ENGINEER OF EXPERIENCE WISHES A SITUATION as Superintendent of a Gas Works. Can give the best reference. Would prefer the Southern or Western States. Address P. B., Box 75, Little Rock, Ark. 245-3t

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 91, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS and other buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity, Retort Settings, Condensers, Washers, Exhausters, Purifiers, Holders, Coal Hoisting Apparatus, Iron Roofs, and every description of Machinery required in the Manufacturing of Gas.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Blowers for Forgers,
Pumps for Water, &c., &c.

REFERENCES:

CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
SAMUEL P. PARHAM, Engineer Mutual Gas-Light Company, N. Y.
Prof. HENRY WURTZ, Editor Chemical Department GAS-LIGHT JOURNAL.
HENRY J. DAVISON, Engineer, 77 Liberty Street, N. Y.
HERRING & FLOYD, Oregon Iron Foundry, 738 Greenwich Street, N. Y.
FREDERICK SABBATON, Engineer Troy Gas-Light Company, Troy, N. Y.
Col. WHITE, Engineer People's Gas-Light Company, Williamsburgh, N. Y.
GEORGE W. PARSONS, Sup't and Eng'r, Rochester Gas-Light Co., Rochester, N. Y.
GEORGE W. EDGE, Engineer, Jersey City Gas-Light Co., Jersey City, N. J.
J. H. GAUTIER & Co., Fire Brick Works, Jersey City, N. J.
Professor SILLIMAN, New Haven, Conn.
JOHN HARRISON, Engineer People's Gas-Light Company, Baltimore, Md.
CHARLES FABEN, Superintendent and Engineer Toledo Gas-Light Co., Toledo, O.
PETER F. BURTIS, Supt. and Engineer, Chicago Gas-Light Co., Chicago, Ill.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [257-1y

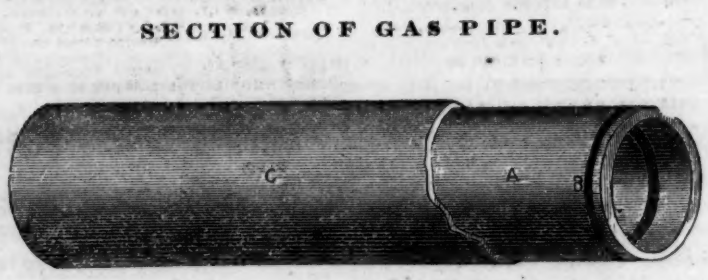
NORTHWESTERN

GAS AND WATER PIPE COMPANY.

WORKS AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 41 REYNOLDS BLOCK.

SECTION OF GAS PIPE.



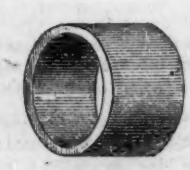


FIG. 2.

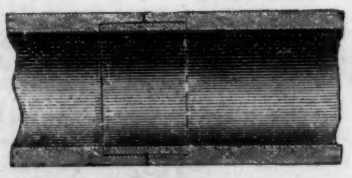


FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the NORTHWESTERN GAS AND WATER PIPE COMPANY.

This Pipe is made of White Pine, one inch to twelve inches bore, in sections eight feet long, rounded in a lathe, coated inside and out with Asphaltum, connected with a tenor, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is UNQUESTIONABLY the best Gas conducting Main in use.

☞ Send for Descriptive Pamphlet and Price List. 242-1y

JOURNAL OF THE

FRANKLIN INSTITUTE.

EDITOR—PROF. W. H. WAHL, PH.D.
ASSISTED BY THE COMMITTEE ON PUBLICATIONS.

This Journal, devoted to Mechanical and Physical Science, Civil Engineering, and the Arts and Manufactures, published in monthly numbers of seventy-two pages each, forming two volumes per annum, illustrated with engravings and wood-cuts.

The Journal is now in its forty-fifth year of publication, and has become a standard work of reference.

TERMS OF SUBSCRIPTION.—Five dollars per annum; payable on the issue of the sixth number. When the full subscription (five dollars) is paid in advance, the numbers will be sent *free of postage*

Communications and letters on business must be directed to the ACTUARY OF THE FRANKLIN INSTITUTE, PHILADELPHIA.

A RARE CHANCE FOR GAS MEN.

FOR SALE.—A COAL GAS WORKS, SITUATE IN A growing and thriving Southern city, now being rapidly developed by railroads. There is a good brick building sufficiently large for Retort Room, Purifying Room, Office and Meter Room. Present consumption from 90,000 to 120,000 feet per month. In the hands of an expert it can be made to yield a handsome income. Can be had on easy terms.

Further particulars can be had by addressing the Editor of this Journal. 241-tf

FOR SALE---A BARGAIN.

A METER PROVER,

IN WORKING ORDER.

Apply at the office of this Journal.

Special Notice.

TO GAS-LIGHT COMPANIES.

Portland Cement

for Lining Tanks and making them perfectly Water Tight.
For sale by L. JAFFE,
1193 Broadway, New York.
☞ Send for circular. 244-3m

FOR SALE.

ONE SET FOUR FOOT ROUND CAST IRON PURIFYING BOXES, all in good order, for four-inch connections; suitable for a small gas works. Also a Plunge Washer to correspond. Will be sold cheap. Address, YOUNGSTOWN GAS CO., Youngstown, Ohio. 244-tnl

WANTED—A SITUATION AS SUPERINTENDANT of a Gas Works making from 1 to 20,000 feet per day Can give good reference as a steady, sober and honest man. Inquire of the Editor AMERICAN GAS-LIGHT JOURNAL. 244

WANTED—A good Gas and Steam Fitter, and one is competent also, to run a Lathe in a Machine To such a person constant employment will be given. but a good workman need apply. Address
CHARLES S. DESPARD,
243-3m Lock Box 31. Parkersburg, West Va

THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—PROF. HENRY WURTZ.
Editor's Private Office, 26 Pine St., Room 36.

This is a recognized official organ of—

LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

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Great Britain—TRUBNER & Co., 60 Paternoster Row, London.
France—LE JOURNAL DE L'ECLAIRAGE AU GAZ, 25 Boulevard Poissonniere.
Brussels, Belgium—HENRI BERGE.

☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

MONDAY, JULY 3, 1871.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to po so.

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General Editorials.

SALUTATORY.

In introducing the Fifteenth Volume of the AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY, the writer has imposed upon him the duty, a duty deemed by him a solemn and momentous one, of announcing that he has now taken up, formally and in full measure, the *editorial* burden and responsibility. In doing this he might indulge easily in the setting forth (which is very usual in like cases) of magniloquent plans and promises for the future conduct and improvement of this Journal; and of schemes, such as have undeniably and naturally been indulged in by him, for the further promotion of the high and honorable position that we already hold before the public.

Such schemes the undersigned admits that he has entertained, but for several reasons his present ent purpose is to ask to be excused from a presentation of them, which might turn out to have been lacking in mature deliberation. His decision to assume this task, though for some time looked forward to as probable, was nevertheless arrived at somewhat suddenly, and for the present it is preferred that we but announce as our general intent that this Journal will in no wise depart, under its present directorship, from those traditions which may now be regarded as established, or diverge from the paths it has now long pursued. It will continue to be a Journal of Progress, and its ambition will still be to prove all things and to hold fast to that which is good.

HENRY WURTZ.

THE ATLANTIC DOCK IRON WORKS.

Though the fact may not be appreciated, or at least not acted upon, by most of us, it is nevertheless true that the cravings implanted within us, for the contemplation of objects exciting emotions of grandeur and power, or arousing feelings of admiration for successful human achievement, may be satisfied to a high degree, in this age, without seekin geither the remoter walks of Nature or the familiar Halls of Art. Objects which minister quite as directly to these grand emotions (without which cultivated life would be but a barren field) are abundantly discoverable among the great industrial operations proceeding in our midst.

Our purposed visit to the above establishment, referred to in our last, has been accomplished; and we shall now seek to convey some part of the gratification we experienced. These Works are devoted exclusively to the construction and fitting up of gas apparatus of every kind. Gas Works, of the greatest magnitude, with all attachments for distribution, and so on, are here turned out to order, and dispatched, in time for immediate erection and use, to all parts of this and other continents. It is one of those establishments now centering around this metropolis and contributing to its growing trade, which ensure the approaching preeminence of American industry in all its branches. The effect of the virtual extinction of the shipping and importing interests of New York by the events of the war of the rebellion, so much deplored, has simply been to direct an immense local capital into other channels, and will have the result of making our city the manufacturing emporium of the world. Such an influence, we may say, is, to our mind, far more in consonance with the best future destiny of our city and nation than any amount of encouragement and stimulus to an influx of foreign luxuries and extravagances.

The Atlantic Dock Works are in South Brooklyn, conveniently situated for the shipping of the most massive castings and machinery. The shops cover about two acres of ground, but a very large additional space is at present occupied by finished work, awaiting transportation.

In our tour of inspection, we first visited the Foundry. In the large casting room, 160 by 60 feet, we found a most interesting apparatus, a steam crane, which has been so modified, by the ingenuity of the Superintendent of the Works, Mr. S. M. HARTWELL, as to be revolved, and otherwise operated, by the same 12-horse engine that does the hoisting. This is accomplished by means of a horizontal circular cable-guide, attached to the girders overhead, on which run two pulley-wheels, operated by simple gearing, at the extremity of the arm of the crane. These pulleys bear close on opposite sides of the cable. By this means, the ponderous machine is swung round with the greatest rapidity and precision, at the will of one man, instead of requiring, as formerly, the slow and exhausting labor of twelve men. Another equally ingenious attachment enables the hoisting gear to be shifted by the engine along the arm of the crane, to and from its vertical axis.

Alongside the foundry, but enclosed in a separate apartment, are the three large cupola furnaces, with their engine and blower. Two things here particularly struck us, one being the blower itself, of the species known to us as the "Root Blower," a kind which is of interest to the gas fraternity from being founded on the same principle as the exhauster arrangement of Mr. GEO. JONES of Birmingham (see CLEGG. p. 181), consisting of two cams, of figure 8 cross sections, revolving in opposite directions, almost without friction, in an ellipsoid drum, the axes of revolution passing through the axes of the ellipse. Mr. KENNEDY much prefers this machine in its practical working to the common fan-blowers. The second was a labor-saving device for feeding the cupolas with coal and pig, by running them up, a ton of each at a time, in a car on an inclined plane operated by the engine, to the charging floor. Great care and precision are exercised by Mr. K. in selecting and mixing the iron and coal for his castings, to secure strength and especially absolute *uniformity* of quality.

Next we entered the Blacksmith's Shop, where we found a scene of brilliant and variegated interest and excitement. Besides the clatter and clang of a dozen or two of ordinary sledges, the "Anvil Chorus" from time to time was joined by the *Steam Hammer*. As we watch the working of this wonder of human invention, can we doubt the immortality of the human soul? How can the dumb device outlive the deviser? This splendid scintilla of the genius of NASMYTH, ready at the bending of a finger now to softly crack a nut and now with swift and stupendous wrath to grind a cannon-ball to powder; under which the tough steel is as potter's clay; a human invention which far better than *Salmoneus*, in *Virgil's* fable:

"*Non imitabile fulmen * * * simularat*";

does not reason forbid that this creature should outlast its creator? These are mysteries, however, beyond our domain, and we must come down again to our practical world.

The same boiler operates the engine of the Steam Crane, that of the Root Blower and Inclined Plane, and supplies steam to the Steam Hammer, though at some hundred yards or more distant. Attached to the blacksmith's shop, we saw also KENNEDY'S machine for stamping out

retort-lids from a solid plate without riveting, reverberatory furnaces for heating, and machinery (potent as well as patent) for bending the bars for KENNEDY'S wrought-iron truss-work columns for Holders, which we illustrated on May 16th, and divers other things of interest. The sight which struck us most, however, in the forging department, was the machine for making holder-plate rivets, technically called an "Oliver." Its operation must be seen to be appreciated. From rods of soft iron taken alternately from the forge-fire, one blow cuts a piece, which is then inserted endwise into a die, and a trip-hammer worked by a treadle, with the feet, or rather with the weight of the whole body, by one or two blows, upsets the metal, striking up the head into its own concave socket, and the finished rivet springs out of the die to make room for another. The skilled artisan who works this machine can make with his unassisted hands (and feet) 2000 rivets per day.

Next, the Machine Shop, where, with other objects of interest, are some fifteen lathes of various patterns for various purposes, three planing machines, some half a dozen punching machines, including one operated by a hydraulic ram, which is up to the task of putting over seventy rivet holes at one motion through the rim of a boiler plate. This seems a "Roland for the Oliver." We saw also a *shearing machine* emulate the broad-sword feat by which Richard the Lion-Hearted is related, in Walter Scott's romance of the Talisman, to have astonished the Sultan Saladin; that is, we saw it with one smooth effort of its mighty jaws, occupying half a second, cut like cheese an iron plate which would doubtless have taken two men, with cold chisels and sledges, atrifle of a half hour or so for its bisection.

On leaving the machine shop, our attention was called to the chimney stack, 175 feet high, which, just before our visit had felt the "*non imitabile fulmen*" referred to above, but luckily, with only the detachment of a few bricks from its topmost tier.

We passed thence to a contemplation of a great array of completed work ready for shipping, lying outside the Works. Here we examined KENNEDY'S Cylindrical Sectional Multitubular Condenser, an apparatus which presents great economy of construction, with an entire assurance of freedom from leakage, advantages due to the cylindrical form of the main casting forming the body of the condenser. Its simplicity is such also that skilled labor is not required for its erection.

We saw also a large number of the castings for the apparatus of the new and great works now being erected at the foot of Eleventh street on the East River for the New York Mutual Gas-Light Co., to which works we have projected an editorial visit, that we shall now soon execute. The purifiers we inspected here complete, and found them to present some novel features worthy of mention. The water seal, for example, is cast in one piece, without riveting, and the bolt-holes for bolting to the boxes, are made in *the pattern itself* and not bored or reamed out afterwards; a circumstance which enabled us to verify the surprising accuracy of the founders work at this establishment, as it could be plainly felt, by passing the finger through (the sections being set up in relative position) how almost exact was the correspondence of these bolt-holes.

In conclusion, let us advise our readers to go and visit the Atlantic Dock Works for themselves, and not rest satisfied with our hasty description.

TROW'S NEW YORK CITY DIRECTORY FOR 1871--72.

A copy of the above named Directory for 1871-72 has been sent to us by the publisher, and is claimed to be more accurate than any that have preceded it. The immense amount of labor required in its compilation can be realized from the fact that it contains 1,268 pages exclusive of 172 pages of advertisements and 63 pages of miscellaneous matter. In this volume there are but 200,953 names against 204,617 last year; a falling off of 3,644 names.

The volume contains some valuable information, as well as an excellent map. In the list of churches we find that the Baptists have 30, Congregationalists 5, Friends 3, Hebrews 26, Lutherans 14, Methodist 40, Africans 4, Presbyterians 41, Protestant Episcopal 71, Reformed Dutch 18, Roman Catholic 39, Unitarian 3, Universalists 5, and miscellaneous 18. There are also 383 publications noticed—magazines and daily and weekly papers.

Erratum.

Our attention has been called, by the authors, to an important error, probably made in the proof reading, by transposing decimal points, in the letter of Messrs. ST. JOHN and CARTWRIGHT in our last issue (page 180), upon their method of Iron Purification, in the passage where they estimate the cost of their material, 34 cents being converted into $34 and $3.40 into $340. The whole passage, corrected, should read as follows:

—"after the requisite amount of our basis material has been provided to supply one sett of purifiers in any works, we can and will guarantee that the cost thereafter (outside of labor) shall not exceed one third of one cent per thousand, or 34 cents per 100,000, $3.40 per million, or, on a very large scale, say $2000 for six hundred million feet."

THE AMERICAN

GAS SCREEN MANUF'G COMP'Y.

LETTERS OF INTEREST TO GAS LIGHT COMPANIES and Superintendents of Gas Works needing new Gas Trays, or Screens, for another season.

Which are the best and cheapest?

We refer to over sixty companies *now* using them.

BROOKLINE, June 17, 1871.

E. DUFFEE, ESQ.:

Dear Sir: You will please make a set of Gas Trays for this Company as soon as convenient, at price named.

In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country.

Respectfully Yours,
H. A. ALLYN,
Superintendent Brookline Gas-Light Co.

EAST BOSTON, June 15, 1871.

Gentlemen: We have used your Screens some five years They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen.

Yours truly,
A. M. NORTON,
Supt. East Boston Gas-Light Co.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE:

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly,
JOHN ANDREW, Supt.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ:

Dear Sir: The Trays ordered by this Company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige. Yours truly,
JAMES F. ROGERS,
Supt. Jamaica Plains Gas-Light Co.

Also see letter from Providence, R. I., in another column.

It will be for the interest of all Gas-Light Companies needing new Trays another season, to give their orders early, to be delivered where wanted, as we were unable to fill orders promptly to Companies ordering late last fall.

American Gas Screen Man'f'g Company.
Haverhill, Mass. 246-3m

J. H. TENNENT & CO.,

MANUFACTURERS AND DEALERS IN ALL KINDS OF

Oils, Lamp Goods & Matches,

HEADQUARTERS FOR THE PATENT

Fire Proof Mica Lamp Chimney.

226 Pearl Street, N. Y. 246-3m

NOTICE TO GAS COMPANIES

WANTED—A SITUATION AS SUPERINTENDENT OF A Gas Works making from Fifty to One Hundred Thousand feet of Gas per day. Can give the best of reference. Inquire of Editors of AMERICAN GAS-LIGHT JOURNAL, 42 Pine street, New York, Room 18. 246-3t.

BLANCHARD & ARNOLD,

Excelsior Car Wheel Works,

Cor. Fourth and Fowler Sts., Milwaukee.

MANUFACTURERS OF

Gas Apparatus,
Bench Castings,
Air and Immersed Tubular Condensers,
Improved Dry Scrubbers,
Purifiers with Imp'd Dry Centre Valves,

and every description of apparatus necessary for large or small Gas Works.

The designs for our apparatus are furnished by JAMES H. WALKER, Engineer and Superintendent Milwaukee Gas Works, who can be consulted on all matters relating to the working, erection of new, or extension of old works.

Parties employing us will find their orders promptly attended to, and satisfaction guaranteed in all cases.

The best references given on these points. 244-6m

FOR SALE.

Purifiers, Condenser and Station Meter.

The RONDOUT AND KINGSTON GAS-LIGHT COMPANY being about to enlarge their Works, offer for sale their present Purifying, Working and Condensing Apparatus, with Station Meter, as follows: Washer 7 feet high, 20 inches diameter, with 6-inch inlet and outlet; six 12-inch Condensers, with 3-inch air pipes; four Purifying Boxes 5 feet diameter, with Covers and Centre Seal, in complete working order; all with 6-inch inlets and outlets. This apparatus is capable of washing, condensing and purifying 50,000 feet of gas per day. Station Meter made by SAMUEL DOWN, four feet by four feet with clock and tell-tale.

The above apparatus will be ready for delivery about July 1st, and will be sold on reasonable terms. For further particulars apply to W. H. TURNER, Sup't,
242-tf Rondout, N. Y.

AGENCY FOR

GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

41 PINE STREET, ROOM 1.

The undersigned having been appointed Special Agent f the introduction of GIBSON'S Substitute for Dip-Pipes in t Manufacture of Coal Gas, respectfully presents for the co sideration of Gas-Light Companies the Circulars and Pa phlet issued by the American Coal Gas-Light Imp. Co., d scriptive of the value of GIBSON'S Improvement, and the mod by which Gas-Light Companies can satisfy themselves of it usefulness, without trouble or expense, at their own works.

Orders for fitting up Valves of any desired form or paten *subject to the generality of the Gibson claim*, and also for SUPPLIE and MATERIALS of every description required for the use of Gas Light Companies promptly attended to by

W. H. GRENELLE, Special Agen

REFERENCE.—RICHARD MERRIFIELD, ESQ., late Vic President MANHATTAN GAS-LIGHT COMPANY.

NOTICE TO GAS COMPANIES.

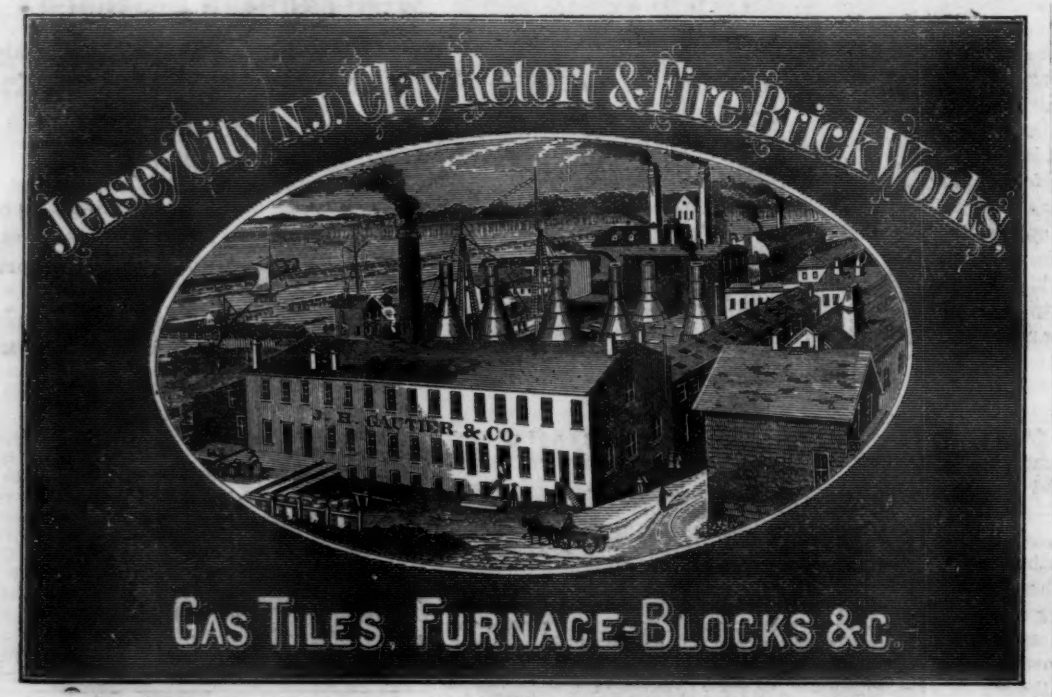
Fulton's Patent Siding

FOR CENTER SEALS, PURIFYING COVERS, &c

The only thing that will not rust. For further information address B. W. SEAVER
245-2t 48 Howard Street, Albany, N. Y.

CHEAP—A BARGAIN.

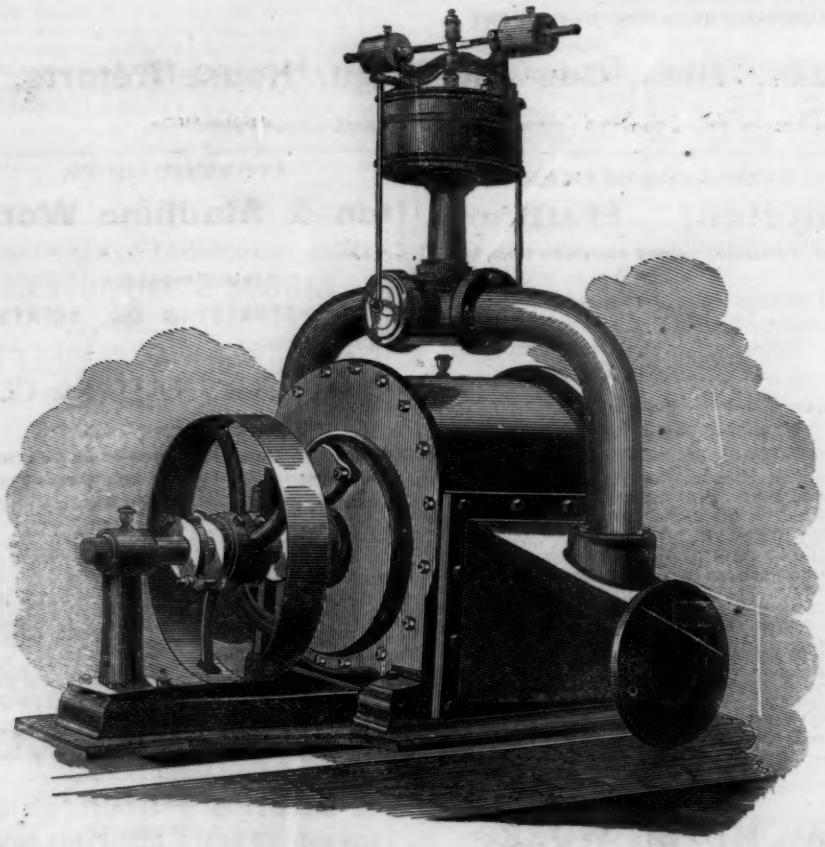
A STATION METER—CAPACITY, 7000 FEET PER Hour; in perfect working order; as good as new; too small for present Works. Price $550; cost $1200. Address
WILSON & GARDNER,
Clay Retort Manufacturers,
246-2t 96½ Fourth Avenue, Pittsburgh.



SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent fuel. Address

B. KREISCHER, President.
JAMES SAYRE, Treasurer.
CHARLES W. ISBELL, Secretary.
OFFICE, 95 LIBERTY STREET, New York.

GRAHAM'S

PATENT LAMP POST!

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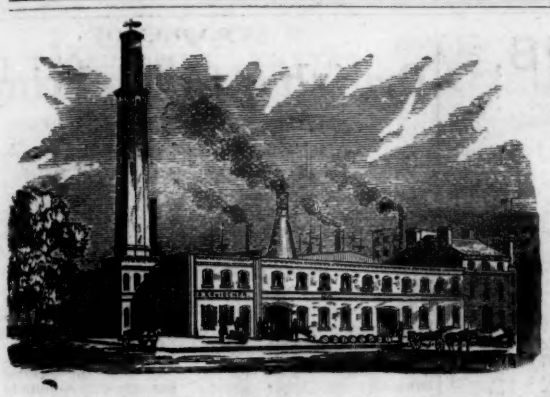

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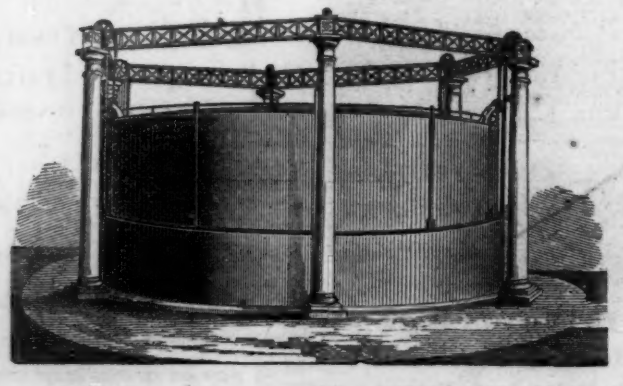

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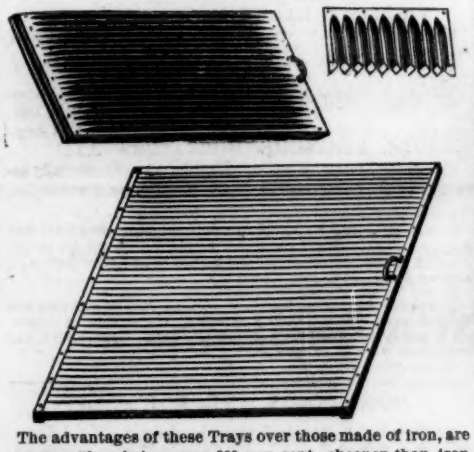

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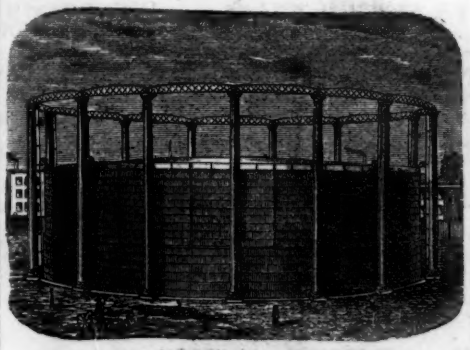

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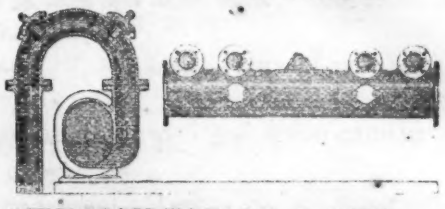

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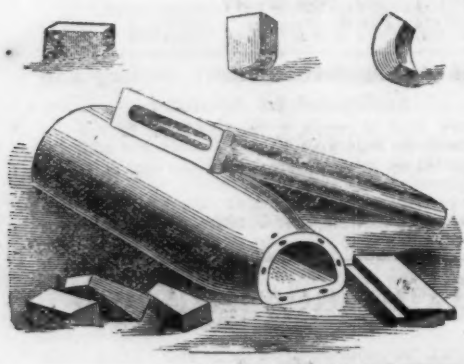

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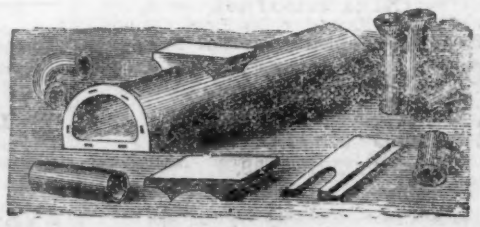

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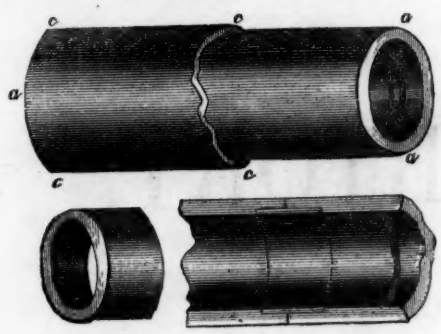

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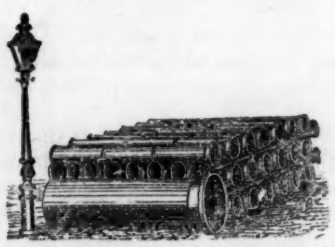

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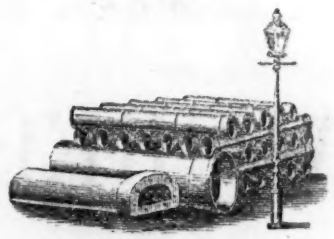

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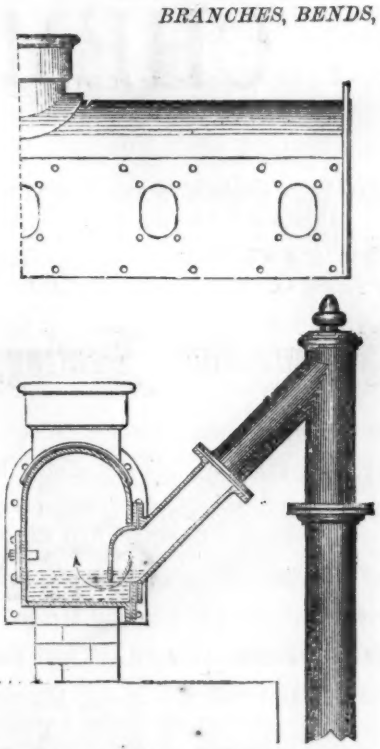

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Flemington, N. J.

Metropolitan Works, N. Y. City.
Binghamton, N. Y.
Rome, N. Y.
Utica, N. Y.
Port Jervis, N. Y.
Elmira, N. Y.
Niagara Falls, N. Y.
Flat Bush, N. Y.
Westchester Co., N. Y.
Batavia, N. Y.
Fredonia, N. Y.
Columbus, Ohio.
Mansfield, Ohio.
People's Works, Cleveland, Ohio.
Newark, Ohio.
Salem, Ohio.
Wooster, Ohio.
People's Works, Chicago, Ill.
Chicago Gas-Light and Coke Co., Ill.
Jacksonville, Ill.
Peoria, Ill.
National Asylum for Discharged Volunteer Soldiers, Milwaukee, Wis.

Detroit, Mich.
La Porte, Ind.
Lawrence, Kansas.
Salem, Oregon.
Port-au-Prince, Cal.
San Jose, Cal.
Stockton, Cal.
Illinois State Penitentiary, Joliet.
Hartford, Conn.
Hagerstown, Md.
Peoples Works, Baltimore, Md.
Elkton, Md.
Milledgeville, Ga.
Augusta, Ga.
New Orleans, La.
Shreveport, La.
Louisiana Ice Manufacturing Co.
Nashville, Tenn.
Murfreesboro, Tenn.
Jackson, Miss.
Houston, Texas.
Galveston, Texas.
And a number of others.

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